Appendix C – State Energy-related Carbon Dioxide Emissions Estimates

For the first time in this report, EIA is providing estimates of State energy-related carbon dioxide emissions. Although energy-related carbon dioxide emissions do not encompass a full greenhouse gas inventory, the State energy-related carbon dioxide emissions do give a good indicator of the relative importance of individual States to the national greenhouse gas inventory since energy-related carbon dioxide emissions represent 83 percent of total U.S. greenhouse gas emissions.

EIA emissions estimates at the State level for energy-related carbon dioxide emissions are based on data contained in the State Energy Data System (SEDS) for the years 1990 to 2001.[1] The State-level emissions estimates include energy consumption data for the following fuel categories: coal, natural gas, and ten petroleum products, including asphalt and road oil, aviation gasoline, distillate fuel (including some kerosene jet fuel), jet fuel, kerosene, LPG, lubricants, motor gasoline, residual fuel, and other petroleum products (including aviation gasoline blending components; crude oil [including lease condensate]; petroleum feedstocks - naphtha less than 401^{o} F; petroleum feedstocks - other oils equal to or greater 401^{o} F; petroleum feedstocks - still gas; motor gasoline blending components; miscellaneous petroleum products; natural gasoline [including isopentane]; petroleum coke; plant condensate; pentanes plus; still gas; special naphthas; unfinished oils; unfractionated stream; and waxes).

The data are presented in three tables:

Table 1. 2001 State Energy-related Carbon Dioxide Emissions by Fuel – The fuel-based estimates are developed from primary fuel inputs of coal, natural gas and petroleum for 2001. The Btu values for State-level energy consumption are multiplied by national-level carbon emission factors used in the national emissions inventory. No attempt is made to adjust national carbon emission factors by State.

Table 2. 2001 State Energy-related Carbon Dioxide Emissions by Energy Sectors– Emissions from primary fuel inputs are estimated by end-use sector, as well as the electric power sector for 2001. At the national level, electric power sector emissions are shared out to the end-use sectors via the amount of electricity sales.[2] At the State-level, electric power sector emissions are not shared out to the other sectors but are represented independently. This avoids complicated trans-boundary issues between States that are not encountered when doing a national emission estimate. In other words, regardless of where the electricity is consumed, the emissions from the primary energy consumed to generate the electricity are attributed to the State in which the generation occurred. For some States slight discrepancies exist between the fuel and sector estimates (0.1 percent). When this occurs, the differences are shared out to the sectors so that the sector tables agree with the fuel tables.

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[1] See EIA website http://www.eia.doe.gov/emeu/states/_use_multistate.html.

[2] The electric power sector consists of NAICS-22 generators whose primary business is to produce electricity. Emissions from generators in the industrial and commercial sectors whose primary business is other than the generation of electricity remain in those sectors.

Table 3. Summary of State Energy-related Carbon Dioxide Emissions, 1990 - 2001 – A time series presents emissions estimates by State for 1990 to 2001. This table utilizes the fuel-based estimates to produce State totals.

Carbon Sequestered by Nonfuel Uses of Energy – All three tables net out carbon, and hence carbon dioxide emissions, that is sequestered due to the fact that a small portion of energy consumption is not combusted because it is used for nonfuel purposes. At the national level, carbon sequestered in nonfuel products is subtracted through a relatively complex process from total national-level emissions. Because of State-level data constraints, a more simplified process is used to allocate the national-level nonfuel sequestration values to the individual States. Three separate methods are used, depending on the nonfuel source.

1. For petroleum products, such as asphalt and road oil and lubricants, where all uses are nonfuel and the sequestration rates are straightforward, the amount of nonfuel sequestered was directly calculated based on State-level activity data and the related national-level carbon coefficients for the particular product.
2. For liquefied petroleum gases (LPG), industry data were used to apportion the total national-level nonfuel sequestration amounts for LPGs to the individual States.[3]
3. For petroleum products other than the above (petroleum coke, residual fuel, and distillate fuel), natural gas, and coal, value added at the NAICS 3251 Basic Chemicals level was used to apportion the total national-level nonfuel sequestration to the individual States.[4]

Municipal Solid Waste and Geothermal Power Generation - A line item for Municipal Solid Waste (MSW) and geothermal power generation is not apportioned to any State because it is not part of the SEDS database. This value fluctuates between 2.4 to 3.5 million metric tons during the 1990 to 2001 time frame. As such, this source ranges from 0.05 to 0.07 percent of total U.S. greenhouse gas emissions.

Balancing Item - The balancing item accounts for minor differences between the national-level inventory and state-level emissions calculations totals. Some of the difference is caused by adjustments that were made at the national level, but were more difficult to make at the state level. The balancing item is not attributed to any State. This source ranges from -12.9 million metric tons to 19.9 million metric tons. In percentage terms, the balancing item ranges form -0.3 to 0.37 percent of total U.S. greenhouse gas emissions.

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[3] American Petroleum Institute, *2001 Sales of Natural Gas Liquids and Liquefied Refinery Gases*. November 2002. Data were aggregated and averaged in order to avoid disclosure of proprietary material.
[4]U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual survey of Manufactures, Geographic Area Statistics: 2000, Issued September 2002, http://www.census.gov/prod/2002pubs/m00as-3.pdf

Table C1. State Energy-related Carbon Dioxide Emissions by Fuel, 2001 (million metric tons carbon dioxide)

State Code	Coal	Petroleum	Natural Gas	Total
AK	1.5	19.9	21.8	**43.2**
AL	79.6	32.8	17.3	**129.6**
AR	25.8	25.6	12.0	**63.4**
AZ	40.0	35.8	12.9	**88.7**
CA	6.3	244.5	132.3	**383.1**
CO	37.7	30.7	20.3	**88.8**
CT	3.8	31.0	7.8	**42.6**
DC	0.1	2.4	1.6	**4.1**
DE	3.6	10.1	2.7	**16.4**
FL	68.4	140.4	29.9	**238.8**
GA	72.7	68.9	18.8	**160.5**
HI	1.7	17.4	0.2	**19.2**
IA	41.9	25.6	11.9	**79.4**
ID	1.0	10.1	4.3	**15.5**
IL	93.5	83.0	50.5	**227.1**
IN	147.5	55.9	26.9	**230.2**
KS	33.4	24.2	14.3	**71.9**
KY	95.2	45.9	11.0	**152.2**
LA	22.4	75.8	67.2	**165.3**
MA	10.3	53.7	19.2	**83.1**
MD	29.9	37.6	9.9	**77.4**
ME	0.7	16.6	5.3	**22.7**
MI	75.0	69.0	48.7	**192.7**
MN	33.3	44.4	18.2	**95.9**
MO	67.5	47.3	15.1	**129.9**
MS	18.7	32.6	17.7	**69.0**
MT	17.4	11.6	3.5	**32.4**
NC	71.3	63.1	11.0	**145.4**
ND	39.5	9.0	3.3	**51.8**
NE	21.4	14.9	6.5	**42.9**
NH	3.8	12.6	1.3	**17.7**
NJ	10.5	80.3	30.1	**120.9**
NM	28.0	17.3	13.8	**59.2**
NV	17.8	17.3	9.6	**44.6**
NY	29.6	118.7	63.2	**211.5**
OH	126.5	82.7	43.2	**252.3**
OK	35.5	39.6	29.0	**104.0**
OR	4.1	25.1	12.4	**41.6**
PA	129.8	97.3	34.8	**261.9**
RI	0.0	7.0	5.2	**12.2**
SC	39.0	29.4	7.1	**75.5**
SD	4.2	7.4	2.0	**13.5**
TN	64.7	43.6	13.1	**121.4**
TX	140.2	289.3	226.6	**656.1**
UT	36.7	17.8	8.9	**63.4**
VA	45.4	61.8	12.8	**119.9**
VT	0.0	6.1	0.4	**6.5**
WA	9.4	57.9	16.9	**84.2**
WI	46.6	44.0	19.1	**109.7**
WV	82.2	12.7	7.5	**102.3**
WY	47.1	10.7	5.5	**63.3**
State Total	**2,062.2**	**2,458.2**	**1,184.7**	**5,705.1**
MSW and Geothermal				**3.1**
Balancing Item				**3.2**
National Total				**5,711.4**

Notes: Most of the MSW and Geothermal emissions consist of Municipal Solid Waste (MSW) -- geothermal carbon dioxide emissions are 0.3 to 0.4 million metric tons per year. The balancing item accounts for other differences between the national-level inventory and state-level emissions calculations totals. Some of the difference is caused by adjustments that were made at the national level, but were more difficult to make at the state level.

Table C2. State Energy-related Carbon Dioxide Emissions by Energy Sectors, 2001
(million metric tons carbon dioxide)

State Code	Commercial	Electric Power	Residential	Industrial	Transportation	Total
AK	2.4	3.3	1.8	21.3	14.4	**43.2**
AL	2.0	73.8	3.6	19.0	31.2	**129.6**
AR	2.1	26.9	2.6	12.2	19.5	**63.4**
AZ	2.0	45.9	2.2	5.4	33.2	**88.7**
CA	14.7	55.8	28.7	73.5	210.4	**383.1**
CO	4.4	41.4	7.2	8.7	27.1	**88.8**
CT	4.2	9.6	8.3	3.8	16.7	**42.6**
DC	1.4	0.2	0.8	0.1	1.7	**4.1**
DE	0.6	5.2	1.2	4.7	4.7	**16.4**
FL	4.5	116.6	1.8	17.1	98.7	**238.8**
GA	3.7	70.1	7.4	18.8	60.5	**160.5**
HI	0.2	7.9	0.1	1.6	9.4	**19.2**
IA	3.6	36.1	4.8	16.0	18.9	**79.4**
ID	1.0	0.6	1.5	4.0	8.5	**15.5**
IL	11.7	85.7	24.1	39.8	65.7	**227.1**
IN	5.7	115.3	9.3	57.4	42.6	**230.2**
KS	2.5	34.9	4.2	13.2	17.3	**71.9**
KY	3.0	89.4	3.9	24.4	31.5	**152.2**
LA	2.1	37.6	3.2	69.2	53.3	**165.3**
MA	5.6	22.1	15.8	8.4	31.3	**83.1**
MD	4.7	30.3	6.8	7.1	28.4	**77.4**
ME	1.4	5.7	3.9	4.1	7.6	**22.7**
MI	10.8	72.8	23.0	29.8	56.2	**192.7**
MN	5.8	31.8	8.8	14.2	35.2	**95.9**
MO	5.0	67.1	8.5	10.0	39.3	**129.9**
MS	1.5	30.6	2.4	10.4	24.1	**69.0**
MT	0.9	17.5	1.4	5.1	7.6	**32.4**
NC	4.2	68.0	6.9	17.5	48.8	**145.4**
ND	0.9	30.6	1.3	13.1	6.0	**51.8**
NE	1.8	20.7	2.9	6.2	11.4	**42.9**
NH	1.3	4.2	2.8	2.1	7.2	**17.7**
NJ	9.7	18.7	16.1	14.0	62.4	**120.9**
NM	1.6	30.4	2.7	9.1	15.5	**59.2**
NV	1.4	24.2	2.0	2.5	14.5	**44.6**
NY	30.5	55.6	38.0	21.2	66.3	**211.5**
OH	11.1	118.2	19.3	35.0	68.8	**252.3**
OK	2.7	43.7	4.1	21.0	32.6	**104.0**
OR	2.1	8.6	2.7	6.6	21.5	**41.6**
PA	12.5	108.6	24.3	47.0	69.5	**261.9**
RI	1.2	3.2	2.6	0.6	4.6	**12.2**
SC	1.6	34.9	2.2	9.8	27.0	**75.5**
SD	0.7	3.9	1.1	2.1	5.8	**13.5**
TN	3.8	56.3	4.5	16.0	40.8	**121.4**
TX	11.8	217.4	14.1	224.2	188.6	**656.1**
UT	2.2	32.9	3.3	10.1	14.9	**63.4**
VA	5.2	42.5	7.5	16.5	48.2	**119.9**
VT	0.7	0.0	1.6	0.5	3.7	**6.5**
WA	3.8	14.0	6.0	18.0	42.4	**84.2**
WI	5.5	43.8	9.6	21.1	29.7	**109.7**
WV	1.9	74.8	2.5	10.8	12.4	**102.3**
WY	1.0	44.0	0.8	9.9	7.6	**63.3**
State Total	**226.8**	**2,233.4**	**366.3**	**1,033.9**	**1,844.7**	**5,705.1**
MSW and Geothermal						**3.1**
Balancing Item						**3.2**
National Total						**5711.4**

Notes: Most of the MSW and Geothermal emissions consist of Municipal Solid Waste (MSW) -- geothermal carbon dioxide emissions are 0.3 to 0.4 million metric tons per year. The balancing item accounts for other differences between the national-level inventory and state-level emissions calculations totals. Some of the difference is caused by adjustments that were made at the national level, but were more difficult to make at the state level.

Table C3. Summary of State Energy-related Carbon Dioxide Emissions, 1990-2001
(Million Metric Tons Carbon Dioxide)

State Code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
AK	34.4	35.1	36.5	36.4	36.2	40.8	41.8	41.8	42.9	43.4	38.6	43.2
AL	107.6	111.5	118.2	122.9	120.8	128.3	133.0	129.7	128.8	131.0	138.0	129.6
AR	49.9	48.8	50.3	49.6	53.4	56.7	61.0	60.2	61.5	63.6	64.3	63.4
AZ	62.3	63.1	65.9	68.4	71.2	66.2	68.6	71.7	76.5	80.3	86.4	88.7
CA	362.5	349.4	353.5	343.6	360.5	349.3	347.5	349.9	359.6	363.4	378.8	383.1
CO	65.6	66.8	67.8	71.8	72.2	72.3	75.4	75.5	77.8	79.6	85.0	88.8
CT	40.7	39.9	40.3	38.4	37.7	36.9	40.6	43.7	41.3	42.6	43.9	42.6
DC	4.4	4.4	4.3	4.5	4.5	4.4	4.4	4.3	4.3	4.1	4.3	4.1
DE	17.6	17.9	17.5	19.2	18.5	17.5	18.2	16.9	16.3	16.5	16.9	16.4
FL	187.3	188.1	190.4	194.2	201.7	206.6	214.5	219.4	231.9	231.3	240.5	238.8
GA	138.0	131.2	130.9	140.7	143.5	151.6	155.1	156.2	157.2	159.6	168.6	160.5
HI	21.7	19.7	20.7	19.0	20.4	20.3	19.3	18.7	18.8	18.5	18.8	19.2
IA	62.7	64.5	63.2	67.7	68.8	72.2	74.4	73.9	77.7	78.9	80.5	79.4
ID	11.3	12.0	11.3	12.4	12.5	13.3	13.9	13.7	14.0	14.8	15.5	15.5
IL	193.9	195.2	191.4	208.4	208.7	212.1	222.6	226.4	216.6	226.7	235.2	227.1
IN	205.1	202.4	199.6	204.5	204.1	209.3	214.2	218.3	219.5	226.0	240.5	230.2
KS	69.3	67.8	65.6	70.9	71.2	68.5	74.6	71.7	70.6	74.3	76.4	71.9
KY	117.1	120.5	124.2	134.9	132.9	138.0	142.5	147.3	145.1	149.6	151.0	152.2
LA	178.8	173.3	179.2	181.0	185.8	186.3	178.4	181.2	167.6	167.7	190.0	165.3
MA	83.5	82.1	84.0	81.4	81.6	78.8	80.4	86.7	84.7	82.2	83.4	83.1
MD	69.6	68.6	66.6	69.0	70.1	69.5	71.6	71.8	74.8	77.4	77.3	77.4
ME	18.9	18.5	19.3	18.9	20.3	18.9	19.7	20.0	19.7	20.7	22.6	22.7
MI	181.1	180.7	179.7	180.4	188.5	190.9	196.7	194.4	193.3	201.3	197.4	192.7
MN	78.4	78.8	80.3	85.4	87.2	90.0	94.3	92.2	92.4	93.3	98.8	95.9
MO	103.9	102.4	102.1	100.6	108.1	115.1	120.9	124.4	129.0	129.7	125.3	129.9
MS	47.9	47.8	47.9	50.2	49.8	51.1	54.0	54.7	55.6	60.6	60.3	69.0
MT	27.5	28.6	29.9	27.9	30.6	30.0	27.3	29.2	31.2	31.8	31.1	32.4
NC	110.2	110.0	120.2	126.0	121.5	127.5	141.6	144.3	143.7	142.2	150.7	145.4
ND	44.2	45.2	46.9	47.3	47.7	47.6	48.4	47.1	48.2	49.3	50.9	51.8
NE	32.9	33.7	32.6	35.9	35.9	38.4	39.4	40.8	42.8	41.6	41.6	42.9
NH	14.6	14.2	14.3	14.9	15.0	15.0	16.1	17.4	17.4	17.6	18.3	17.7
NJ	114.6	114.8	121.7	118.3	128.0	127.2	123.1	125.0	120.2	124.0	124.0	120.9
NM	53.1	49.0	51.5	52.4	52.3	50.9	53.2	56.7	56.2	57.1	59.1	59.2
NV	30.4	32.2	33.2	33.8	36.0	35.2	37.7	37.7	40.4	41.1	45.3	44.6
NY	207.7	199.9	198.9	194.2	192.4	197.7	204.8	209.7	208.5	210.6	216.8	211.5
OH	244.2	242.4	247.3	252.6	249.1	250.9	263.0	258.7	257.8	256.9	264.9	252.3
OK	88.0	89.4	92.3	95.7	94.1	94.9	97.6	99.1	97.5	97.0	100.4	104.0
OR	30.6	34.4	35.5	35.8	37.2	34.5	36.6	36.1	41.8	43.1	41.6	41.6
PA	262.5	255.2	263.6	268.2	265.7	268.3	273.1	274.8	263.5	262.0	276.2	261.9
RI	8.8	10.7	13.0	10.8	12.8	12.0	13.5	13.5	13.8	13.2	11.7	12.2
SC	59.0	60.8	60.0	64.4	64.5	63.4	65.6	67.7	70.7	73.8	77.7	75.5
SD	11.8	11.5	11.6	12.4	13.0	12.8	12.7	13.2	12.8	13.4	14.2	13.5
TN	103.2	98.8	104.4	115.0	109.7	116.1	114.6	117.6	116.5	117.2	123.4	121.4
TX	552.6	547.3	553.4	566.2	565.7	568.7	619.5	640.3	645.6	629.2	657.5	656.1
UT	53.9	52.8	54.4	56.3	57.4	57.7	58.5	60.6	63.0	61.9	65.0	63.4
VA	94.2	95.8	97.1	101.6	100.6	102.6	107.6	109.8	111.6	113.6	123.0	119.9
VT	5.4	5.6	6.1	6.1	6.0	5.9	6.2	6.4	6.2	6.4	6.7	6.5
WA	70.0	71.2	79.3	75.2	79.9	77.5	79.8	78.1	81.9	83.1	82.8	84.2
WI	85.1	87.6	86.7	90.3	93.5	96.4	104.4	107.4	105.0	109.3	111.8	109.7
WV	106.7	96.9	98.9	100.0	107.5	105.7	104.3	107.7	111.4	112.1	112.2	102.3
WY	56.5	54.7	60.4	57.7	59.9	57.7	59.1	58.5	63.3	61.8	63.0	63.3
State Total	**4,980.8**	**4,932.9**	**5,023.9**	**5,133.2**	**5,206.3**	**5,259.3**	**5,445.3**	**5,522.1**	**5,548.4**	**5,606.6**	**5,808.1**	**5,705.1**
MSW and Geothermal	**3.5**	**2.4**	**2.7**	**2.7**	**2.9**	**3.0**	**3.0**	**3.1**	**3.1**	**3.1**	**3.0**	**3.1**
Balancing Item	**-2.4**	**8.2**	**18.6**	**-5.2**	**-2.0**	**-5.5**	**-3.5**	**-12.9**	**3.9**	**19.9**	**-17.1**	**3.2**
National Total	**4,981.9**	**4,943.5**	**5,045.2**	**5,130.7**	**5,207.2**	**5,256.8**	**5,444.8**	**5,512.2**	**5,555.3**	**5,629.6**	**5,793.9**	**5,711.4**

Notes: Most of the MSW and Geothermal emissions consist of Municipal Solid Waste (MSW) -- geothermal carbon dioxide emissions are 0.3 to 0.4 million metric tons per year. The balancing item accounts for other differences between the national-level inventory and state-level emissions calculations totals. Some of the difference is caused by adjustments that were made at the national level, but were more difficult to make at the state level.